Patent Claims

1. Process for in-situ decontamination of an EUV lithography device with the following steps:

- Measuring the current degree of contamination,
- Comparing the degree of contamination with at least one given threshold value,
- Adjusting the O_2 supply to the lithography device,
- Repeating the above steps,

whereby all the steps are completed during the exposure operation.

2. Process according to claim 1, **characterized in that** in addition to adjusting the O_2 supply, UV radiation of a wavelength between 150 nm and 300 nm is radiated into the EUV lithography device.

3. Process according to claim 1 or 2, **characterized in that** the degree of contamination is measured with the help of one or several oscillators which react to a change in its surface mass by changing resonance frequency.

4. Process according to claim 1 or 2, **characterized in that** the degree of contamination is determined by reflectivity measurements.

5. Process according to claim 1 or 2, **characterized in that** the degree of contamination is determined ellipsometrically.

6. Process according to claim 1 or 2, **characterized in that** the degree of contamination is determined by measuring a stream of photons.

7. Process according to claims 1 to 6, **characterized in that** the degree of contamination is determined while oxygen is being supplied.

8. Process according to one of the claims from 1 to 7, **characterized in that** a precise threshold value is given, whereby exceeding the threshold value results in oxygen in a partial pressure range between 1×10^{-10} mbar to 1×10^{-3} mbar being added, and in the event that the threshold is not reached, the supply of oxygen being stopped.

9. Device for in-situ decontamination of optical elements in an EUV lithography device, including at least one measuring device (3) to measure the degree of contamination of the optical element(s) and a connected control unit (4), which is connected to a device (5a) to supply O_2 to the EUV lithography device, and which is set up to compare the measured degree of contamination with at least one pre-set threshold value, and to control the supply of oxygen in relation to the corresponding comparison results.

10. Device according to claim 9, **characterized in that** the device has at least one light source (5b) for radiation in the wave length range between 150 nm and 300 nm.

11. Device according to claim 9 or 10, **characterized in that** at least one measuring device (3) has at least one quartz crystal microwave (3) set up inside the lithography device.

12. Device according to claim 9 or 10, **characterized in that** the measuring device (3) has at least one additional light source and at least one detector, which are set up within the lithography device.

13. Device according to claim 12, **characterized in that** a polarizer is set up in the beam path of at least one light source, near the light source, and an analyzer is set up near the detector.

14. Device according to claim 9 or 10, **characterized in that** the measuring device (3) has the means to measure a stream of photons that are connected to an optical element (2) in the EUV lithography device.

15. Device according to claims 9 to 14, **characterized in that** a measuring device connected to the control unit (4) is set up as a residual gas-measuring device.

Conclusion

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EUV lithography devices do indeed have a vacuum or an inert gas atmosphere in their interior, yet the appearance of hydrocarbons and/or other carbon compounds within the device cannot be fully prevented. These carbon compounds lead to the contamination of the optical elements and a resulting loss in reflectivity. In order to counteract this, it has been suggested that while operating the EUV lithography device, the degree of contamination should be constantly monitored, e.g. using quartz crystal microwaves. Depending on the degree of contamination, oxygen is supplied to the interior of the lithography device. The oxygen, in combination with exposure radiation breaks down the contamination while the lithography device is running. The EUV lithography device is thereby equipped with at least one measuring device (3) and a connected control unit (4), which is connected to the oxygen supply (5a).

(Figure).